Coastal Change and Dynamic Communities

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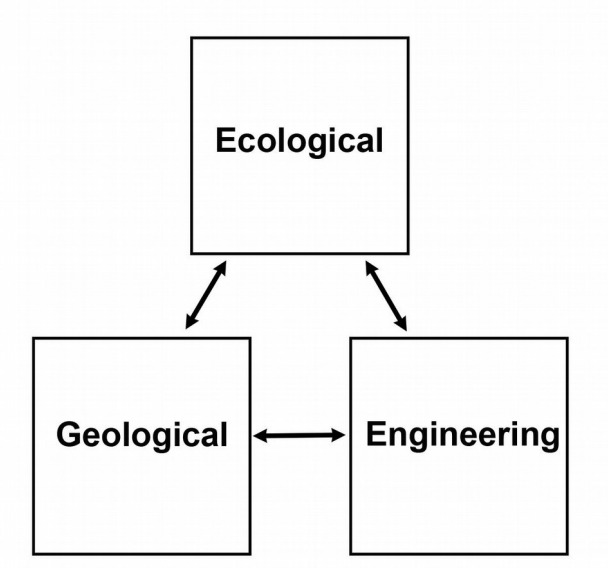
The Idea:

Coastal ecosystems are inherently dynamic: tides, erosion, and storm surge are all natural coastal processes. Climate change and other human impacts are intensifying these processes and introducing new challenges such as sea level rise and more frequent and powerful coastal storms. Coastal communities have a difficult time acting proactively in order to be resilient to dynamic coastal areas. This difficulty is due to several factors including the relatively short time frame and static thinking used by planners, developers, and other local actors. People also lack an understanding of how coastal ecosystems can change, especially, if they have not yet experienced this change in their lifetime. This research framework seeks to explore how coastal communities can become better suited for living in dynamic coastal systems, and thus shift from clutching to the status quo of short-term thinking, and begin extending the time frame for thinking about future solutions to climate change to 50-100 years.

Specific recommendations:

In order to understand the interactions between coastal systems and climate change, a first step would be evaluating historical responses to specific coastal hazards, such as storm surges, sea level rise, and coastal erosion. The responses would be evaluated through a lense specifically focused on identifying feedbacks between ecological, geological and engineering systems, and include examples across different community types (urban, rural), and include local, national and international examples.



An example of feedback between systems is using beach nourishment in response to coastal storms. Beach nourishment is integrally linked to not only ecological systems (habitat provision, etc.), but also social and economic systems. A common human response to wider, more protected coasts has been the construction of larger homes, which feeds back to economics and social dynamics of coastal communities (gentrification). Examining these feedbacks can help identify responses and potentially identify opportunities to change the evolution of the coast moving forward.

A second step would be to identify plausible futures which will be affected by current and future decisions. These futures should consider changing environmental conditions (sea level rise, coastal storms, erosion, etc.), and human conditions (development patterns, differential impacts of climate change, unequal access to political power, variation in economic basis and opportunity, technological advancements, etc.). Information gleaned from the historical analysis provides context for considering feedbacks in developing these scenarios. Community interaction should be incorporated in developing the future scenarios in order to ensure that vulnerable and/or under represented communities are included. The ability and willingness of people to adapt to changing coasts in each scenario will be identified and measured with both qualitative and quantitative methods.

Potential uses of the scenarios include the identification of tipping points through community interaction/dialogue (perhaps in a gaming environment), increased community understanding of the dynamic and uncertain nature of the coast, and the impetus for designing more dynamic communities which can proactively adapt to a range of future scenarios.

Value of the idea:
By identifying the feedback loops and developing scenarios between ecological, geological, and engineering systems, this project would identify, and measure, key concepts that can be used for developing policies for planning for and reacting to coastal changes, including identifying tipping points, evaluating the cost of inaction, develop an understanding of the acceptance of risk and uncertainty in coastal communities, and how this informs the coastal communities' ability and willingness to adapt to changing coasts. Identifying and measuring these key concepts, would have to consider differential impacts on communities and their inhabitants, to better identify a broad set of participants from coastal communities.

Tipping points help communities identify and understand points of no return, where ongoing coastal changes make dramatic changes in where and how humans interact

with the coast. A key item in identifying tipping points is to identify the cost of inaction given future prediction of coastal changes, as well as possible solutions.

For example, at what point does environmental threat or existing damage make retreating to the status quo impossible? Being able to identify communities that may be heading for a tipping point early on, will help extend the time horizon of future solutions from the short term (5-10 years) to the long term (50-100 years).

Changing coasts influence people's perception of uncertainty and risk, which influences the range of politically and economically possible policy solutions. As coastal communities grapple with changing coasts, learning how individuals and communities understand and accept risk and uncertainty as they consider future coastal scenarios, influences the ability and willingness to reconsider reinvesting in the status quo.

For example, a community where coastal threats are understood and accepted, will have different risk perceptions than a community experiencing initial changes, differences that can significantly impact possible reactions to coastal threats.

Doing this well requires identifying the differentiated impacts of changing coasts on individual and communities, to better ensure the broad community participation needed to make decisions that are transparent and accepted by coastal communities.

Why needed?

Increased understanding of the evolution of coastal systems, facilitates a more proactive response to coastal hazards and extends the time frame for thinking about future planning of coastal communities. To achieve support for choices which are also consistent with scientific expectations, we will need to share this scientific knowledge. People and communities who now regard coastlines as fixed and static features can be influenced more effectively if we know more about their awareness of coastal change. In many places, people and communities are not aware that coastal areas are dynamic places and have low tolerance for risk. These attitudes and perceptions need to be better understood as we work to synthesize knowledge and disseminate it in connection with coastal planning, environmental management and engineering designs. This will enable us all to practice longer-term thinking, reaching out at least 100 year in the future, as we plan future coastal places and react to ongoing coastal changes.